SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY VISHNUPURI, NANDED-431606

Synopsis of the proposed research plan

Title of research proposal

"BIOPROSPECTING OF SOME MEDICINALLY IMPORTANT PLANTS OF LAMIACEAE FROM KINWAT AND MAHUR REGION OF NANDED, MAHARASHTRA".

Submitted for the degree of

Doctor of Philosophy in Botany
Under
Faculty of Science

Submitted by
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(M. Sc. Botany, CSIR NET JRF, SET)

Under the Guidance of
Dr. D. M. Jadhav

Asst. Professor and Research Guide,
P.G. Department of Botany,
N. E. S. Science College, Nanded.
Re-accredited with "A" Grade by NAAC (CGPA 3.38)

MAY-2019

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Place of work

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Introduction

Bioprospecting is the important phenomenon which refers to prospect the glimpse of biological diversity in transforming indigenous knowledge to new scientific domains. Among the rich biodiversity, plants represent large swath which has shaped the biosphere and enlightened inhabitants since life arose (Baker and Satish, 2013). Plants inhabit almost every corner of the globe and form one of the accessible regimes for therapeutic agents. Exploitation of medicinal plants can be traced since millennia with traditional records demonstrating the use of plants in curing various illnesses (Mahesh and Satish, 2008). Till date plants form one of the troves for drug discovery research and most of the drugs available in the market are directly or indirectly related to plant origin (Newman and Cragg, 2012). Medicinal plants owing to rich repertoire of value added products have gained tremendous scientific and commercial interest. Medicinal plants have a promising future because there are about half million plants around the world, and most of them bear biological activities which are yet to investigate. By considering the same view in the present investigation we have undertaken bioexplorative study of some medicinal plants of family lamiaceae from Kinwat and Mahur region of Nanded district of Maharashtra state.

The Lamiaceae (Labiatae) is one of the most diverse and widespread plant families in terms of ethnomedicine and its medicinal value is based on the volatile oils concentration (Sarac and Ugur, 2007). The Lamiaceae plant family is one of the largest families among the dicotyledons, many species belonging to the family being highly aromatic, due to the presence of external glandular structures that produce volatile oil (Giuliani *et. al.* 2008). This oil is important in pesticide, pharmaceutical, flavouring, perfumery, fragrance and cosmetic industries (Ozkan, 2008). Medicinal plants have an important value in the Socio-cultural, spiritual and medicinal use in rural and tribal lives of the developing countries (Hendawy, 2010). People around the world use between 50,000 to 80,000 flowering plants for medicinal purposes (Naguib, 2011). Medicinal and aromatic plants are known to be used by 70% to 80% of global population for their medicinal-therapeutic effects as estimated by WHO (WHO, 2008).

Many members of the family are widely cultivated, owing not only to their aromatic qualities but also their ease of cultivation. These plants are among the easiest plants to grow and propagate. Besides those grown for their edible leaves, some are grown for decorative foliage, such as *Coleus*. The enlarged Lamiaceae contains about 236 genera and 6,900 to 7,200 species (Stanko *et.al.* 2015). In Marathwada region the lamiaceae is represented by 12 genera and 37 species (Naik, 1998).

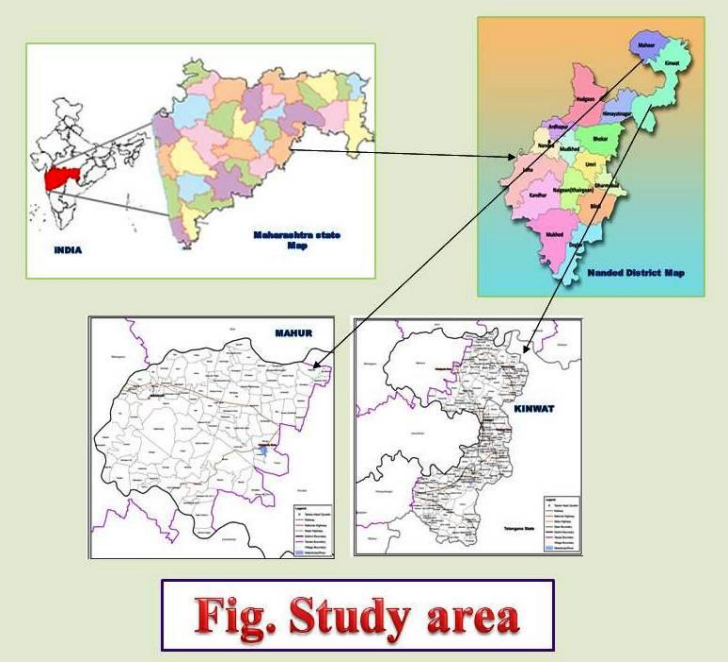

Fig. (1) MAP OF STUDY AREA

Nanded district comprises 16 talukas out of which Kinwat and Mahur are popular tribal talukas with rich in vegetation of plants, valleys, mountains with ample forest and declared as reserved forest by Government of Maharashtra. The type of forest is dry deciduous forest. (Naik, 1998; Wadood Khan; 1985; Zate, 1983) These talukas also has major amount of wealth of medicinal plants. The local tribe and local residing people of Kinwat and Mahur Talukas have very important and basic ethno medicinal knowledge of medicinal plants in these vastly diverse areas.

Study area includes the forest ranges from Kinwat and Mahur taluka of Nanded district. Over all forest cover of Nanded is 91,748 hectares forest area which is 11.92 % of the total area. Forest cover in Kinwat is 57,800 hectares which is near about 39.34% of total forest cover of the taluka while Mahur taluka has 14397.39 hectares forest cover.

Geographical position of the Kinwat is 19^0 25 to 19^0 55 N latitude and 77^0 51 to 78^0 19 E longitude. Geographically position of the Mahur is 19^0 49 to 19^0 83 N latitude and 77^0 91 to 77^0 55 E longitude. Mahur or Mahurgad is a religious place in Maharashtra, India. Mahur is said to be the birthplace of Hindu Goddess Renukadevi or Matapur Niwasini Jagdamba Devi, mother of Lord Parshuram. Both these taluka of Nanded districts has old heritage of medicinal plants and herbal medicine. Forest is rich in biodiversity and consists of rare medicinal plants.

Biogeographical condition such as altitude, soil type and average rain fall make the vegetation rich in this area. The local tribes Andh, Gond, Kolam, Naikde and pradhan use forest resources for their day to day life (Kanthale and Biradar, 2012).

The forest of this region is dominated by *Tectona grandis* followed by *Dalbergia sisoo, Terminaila, Acacia species, Wrightia sp., Boswellia, Bombax* and many other herbs, shrubs as well as trees. The first strata of the forest vegetation is formed by these tree species. Large number of shrubs and small trees, extensive climber and twiners like *Dioscoria, Hemidesmus, Cercopegia, Gloriosa, Tinospora, Diplocyclos* etc., and also shrubs and small trees like, *Woodfordia , Eryhthrina, Ventilago, Vitex* forms the second strata of forest vegetation. Kinwat and Mahur forest ranges contains diversified medicinal plants which are used by local tribal peoples.

Review of Literature and Development in the Subject (Previous work done in the relevant area)

The floristic studies in the region of Marathwada started after **V.N. Naik** joining Department of Botany in Marathwada University Aurangabad. There are few important publications which give information about exploration of some medicinally important plants from Kinwat and Mahur region of Nanded district.

Mahabale (1987) has published a list of plants of Kinwat. **Patunkar (1976)** made and excellent study of grasses of Marathwada. **Zate (1983)** explored the flora of Kinwat and Mahur range forest and identified 874 species of plants belonging to 447 genera from 107 families. **Wadood Khan (1985)** has also studied flora of Bhokar & Hadgaon range forest of Nanded district, he studied 772 indigenous species from 410 generas belonging to 101 families of angiospermic plants. **Madhukar Reddy (1986)** studied flora

of Godavari valley and southern plains of Parbhani and Nanded district during these studies he was also visited probably Kandhar fort and enumerated some of the angiospermic plants.

Sharma (2006) studied bioprospecting in the exploitation wild diversity in search for useful resources such as medicines. Traditional medicines aided by pharmacological and antimicrobial studies may lead to the development of new and effective drugs. The pharmacological activities of flavonoids are gaining importance with new findings on the beneficial health effects. Flavonoids possess free radical scavenging properties. Natural products including flavonoids offer a wild scope for the drug research.

Raut and Karuppayil (2013) studied bioprospecting of plant essential oils for medicinal uses. Essential oils are used in almost all traditional system of medicine like-Ayurveda, Siddha, Unani and Chinese traditional system of medicine. Essential oil extracted by steam distillation and constitute complex mixture of low molecular weight compounds. Terpenes and Terpenoids forms the major constituents of essential oils and determine the aroma as well as biological properties. They evaluated essential oils for antibacterial activities, antifungal potential, anticancer activity, antiviral properties, anti mutagenic activities, antioxidant potential, antidiabetic activities, inflammation preventive properties, antiprotozoal efficacy.

Kanthale and Biradar (2012) studied ethnomedicinal uses of plant wealth by Gond, Kolam, Pradhan, Naikde and Andh tribes of Mahur range forest. 25 plants were recorded which are used by tribal peoples in formulation of 32 different ethnomedicinal preparations for curing 24 types of different diseases such as white discharge, dysentery, fever, cough, kidney stone, asthma etc. They also observed that tribal's of Mahur forest ranges have adequate ethnomedicinal knowledge.

Vijigiri and Raut (2019) conducted ethno-medico botanical explorations in forest areas of Mahur taluka resulted in the information on the plants used in treating many diseases. Information gathered from Mahur taluka indicates that the indigenous and other village people of this region have good knowledge of plants in treating different ailments.

Majority of the species reported were from families Lamiaceae, Fabaceae, Acanthaceae and Euphorbiaceae.

Ghorband and Biradar (2012) carried out an ethnomedicinal survey during 2007-2009 and collected information on the use of medicinal plants from herbal practitioners of Gond, Andh, Kolam and Pradhan tribes of Kinwat forest ranges of Nanded district of Maharashtra. Tribes are mainly depending upon forest flora for their livelihood and for curing the ailments and diseases. They recorded 25 ethnomedicinal plants for preparing 25 types of formulations to treat 25 types of diseases. 19 plants are used for polyherbal preparations. The study done provides information about some therapeutic uses of 25 angiospermic plant species belonging to 21 families.

Objectives of Research/Proposed Hypothesis

1. To survey medicinally important plants of lamiaceae from Kinwat and Mahur region.
2. To perform phytochemical analysis of some selected plants of lamiaceae.
3. To determine antioxidant activity of some selected plants.
4. To determine antimicrobial potential of some selected plants**.**
5. To determine anticancerous and antidiabetic efficiency of selected plants.
6. Chromatographic and spectral characterization of selected plants of lamiaceae.

Methodology

The present work will be carried out by using standard methodology and established protocols in the laboratory in following phases.

Phase-I: Literature survey, collection of plant materials.

In first phase initially focus will be given on literature survey, knowing geographical features of the area along with metrological data, brief history of botanical exploration and general characters and vegetation. Exhaustive information on medicinal plants of lamiaceae will be gathered from local tribal communities such as Bhill, Ghond, and Aandh and from the so called local traditional healers of the area. Accordingly plant materials will be collected from the field identified using standard flora (Naik V. N. 1998).

Phase-II: Plant extraction and preliminary phytochemical analysis.

In this phase collected plant samples from the field will be subjected for solvent extraction using soxhlet unit. The phytochemical analysis will be done from different plant parts. To do the phytochemical analysis standards procedures will be followed as mentioned by Harborne, (1973), Sadasivan & Manikam, (2005) and Thimmaiah, (1999).

Phase-III: Antimicrobial activities of plant extract.

Antimicrobial activity of plant extracts of Lamiaceae will be tested against different fungi and bacteria for their growth inhibition. This study will be done by using standard protocols.

Phase IV: Antioxidant, Antidibetic and Anticancerous activity.

In this phase emphasis will be given in studying Antioxidant, Antidibetic and Anticancerous activity using standard protocols such as, Oktay, *et.al.*, (2003), Kamleshiya, *et.al.*, (2012); Abdullah and Kashim, (2017); Anticancerous activity will be done by employing outsourcing facility available at specific scientific research labs (Rubinstein and Boy, 1990).

Phase-V: Instrumental analysis of plant extracts.

This phase of study will emphasize on chromatographic and spectral characterization of some plant extracts.

Phase-VI: Thesis writing and Submission.

Scientific writing of thesis will be done for final submission to University.

Importance of study/ Society application

International status:

Several workers from abroad and other continents have also reported the vast potential of Lamiaceae.

In Ethopia **Assefa et. al. (2016)** studied bioprospecting potential of *Ocimum basilicum* belongs to the Lamiaceae family around Bahir Dur city Administration, west Gojam and north west Gondar zones, Amhara regions. Accordingly *Ocimum basilicum* has high bioprospecting potential for pharmaceuticals, food and cosmetic industries.

In Iran **Joudi et. al. (2011)** explored medicinal species of lamiaceae family in Ilkhji Sharafaldin Regions. In this research medicinal species of lamiaceae family were detected. They collected plants in two regions according to classical method of regional

floristic studies and then medicinal species were chosen by using pharmacopeias. Medicinal species of these two regions consists of *Marrubium vulgarae*, *Mentha longifolia, Nepta persica, Stachys lavandifolia, Thymus cotschyanus, and Salvia schendica*. In their study they have documented data regarding availability of ethno medicinal plant resources which have various potential uses. From this study they found that plants were used to treat mostly as Laxative, Antibacterial, Antioxidant, Sedative, diuretic and cardio tonic.

Stanko *et. al.* (2015) from Czech Republic reviewed medicinal plants of family Lamiaceae as functional food. Historically species of the family Lamiaceae have enjoyed a rich tradition of use for flavoring, food preservation and medicinal purpose, due to both their curative and their preventive properties. Each species has a special complex mixture of bioactive compounds in which each compound contributes to its overall bioactivity.

National status:-

At National level different peoples are working on bioprospecting of plants. Here we are citing some of the names.

Venkateshappa and Sreenath (2013) studied few medicinally potential plants of lamiaceae of Karnataka. The detailed information collected shows its potential therapeutic values and is a rich source biologically active compounds. The potential of the plants to be an excellent analgesic, antipyretic, anti-inflammatory, antifungal, antiplasmodic, antioxidant, antimicrobial, antidiabetic, antiasthmatic, antidiarrihoea, antidote antiseptic treatment for skin diseases and influenza.

Raja R. (2012) studied medicinally potential plants of lamiaceae family from Tamilnadu India . Plants in this family are herbs, shrubs often with an aromatic smell, contains high amount of essential oil that enables them to survive the hot summer season. Medicinal constituent includes the strong aromatic essential oil, tannins, saponins and organic acids. Some medicinally potential plants of family lamiaceae are following like volatile oil of cineole presenting Tulsi, Menthol and limonene having peppermint, 45-60 carvone, thymol, caravachol having the Thyme and forskolin..

Rai *et.al.* (2016) from Karnataka investigated antioxidant potential of crude leaf extracts of *Pogostemon heyneanus* and *Plectranthus amboinicus* medicinal plants from

lamiaceae family. The antioxidant activity of extracts was evaluated by DPPH and H_2O_2 assays. Effective antioxidant activity was shown by the methanol extract of *P. amboinicus*. The preliminary investigation, it is evident that the crude extracts from the leaves of *P. heyneanus* and *P.amboinicus* has appreciable anticancer activity against breast cancer cell lines.

Britto et.al. (2012) from Tamil Nadu evaluated antimicrobial activity and minimum inhibitory concentration against ten human pathogen. They selected 8 plant species belonging to family Lamiaceae. The qualitative Phytochemical screening of selected species of lamiaceae revealed the presence of secondary metabolites, reducing sugar, alkaloids, phenolic compounds, tannin and amino acids were present in all species investigated. Generally all extracts were effective against pathogen at their highest concentration. The inhibition zone ranged from 7 to 15 mm.

Biradar and Ghorbhand (2010) assessed ethnomedicinal applications of plants by tribal of Kinwat forest ranges of Nanded district of Maharashtra through survey during 2006-2008. Ethnomedicinal preparations, dosage and their mode of administration was gathered from herbal practitioners of Gond, Kolam, Andh and Pradhan tribes. In there investigation they brought to light 25 medicinal plants used against various diseases by rural population in different rural and forest areas of Kinwat tehsil of Nanded District.

Significance of the study:

Exploration of wild diversity for useful resources is called Bioprospecting. It covers a wide range of commercial activities in different industrial sectors including pharmaceuticals, food, beverages, biotechnology, seed, crop protection, horticulture, botanical medicines and cosmetics and personal care. It provides valuable leads for new product development and many companies look for new applications of biological species that have not been studied earlier. As such, they enter into collaborative programmes with collectors in different countries to procure their needed supply of bio resources

The study of diversity of medicinal plants from a specific geographical region is a need of hour. The knowledge by which the tribal and rural people are surviving since

time immemorial will be surely helpful to the humanity, with this point of view the present work was under taken to explore more about Lamiaceaeous plants in Kinwat and Mahur forest of Nanded district, Maharashtra.

As this family having aromatic volatile oil and many other compounds, the present study will be useful to explore more about the plants of Lamiaceae. The chromatographic characterization proposed in the current study will find its application in the taxonomic identification of various species of lamiaceae. Anticancerous, antidiabetic study will be useful in finding plant species with potential medicinal applications. Along with these antimicrobial, antioxidant and Phytochemical studies are also useful for the characterization of the various species of lamiaceae.

Proposed work Plan/ Formulation and Structure of Study: Year-wise Plan of work and targets to be achieved

Sr. No.	Year	Activity	Tentative Duration
1)	Ist Year	Literature survey & Review of literature	12 Months
		Survey, Collection and identification of Plants	
		Laboratory extraction of Plant Materials	
2)	IInd Year	Primary phytochemical analysis of extract.	12 Months
		Antimicrobial Activity of plant extracts	
		Antioxidant and Antidiabetic activity of extracts	
3)	IIIrd Year	Studies on Anticancerous activity of extracts	12 Months
		Instrumental Analysis of plant extracts	
		Data analysis and thesis writing for submission.	
	• **Presentation of the research work, attending conferences, workshops will be done alongside all the activities as per mentioned in above table.**		

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